

The background of the slide is a photograph of the World Trade Center towers on September 11, 2001. A large, billowing plume of dark smoke rises from the base of the towers, partially obscuring the sky. The towers themselves are visible, with one showing a significant impact and fire. The overall tone is somber and historical.

FDNY

14,000 Fire & EMS Workers

Proudly Serving New York and the USA

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- Co-Director FDNY WTC Medical Programs**
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Pre-Plan

DISASTER

Pre-Plan

After Action Lessons
Learned, Forgotten or Ignored ?

RESPONSE

Good Plan -> Seamless

RECOVERY

Poor Planning &/or Execution
Prolonged Misery



**TOO
EARLY**

**ON TIME OR
TOO LATE**

**LEFT
BEHIND**



**TOO LATE &
DISORGANIZED**

WRONG OUTCOME



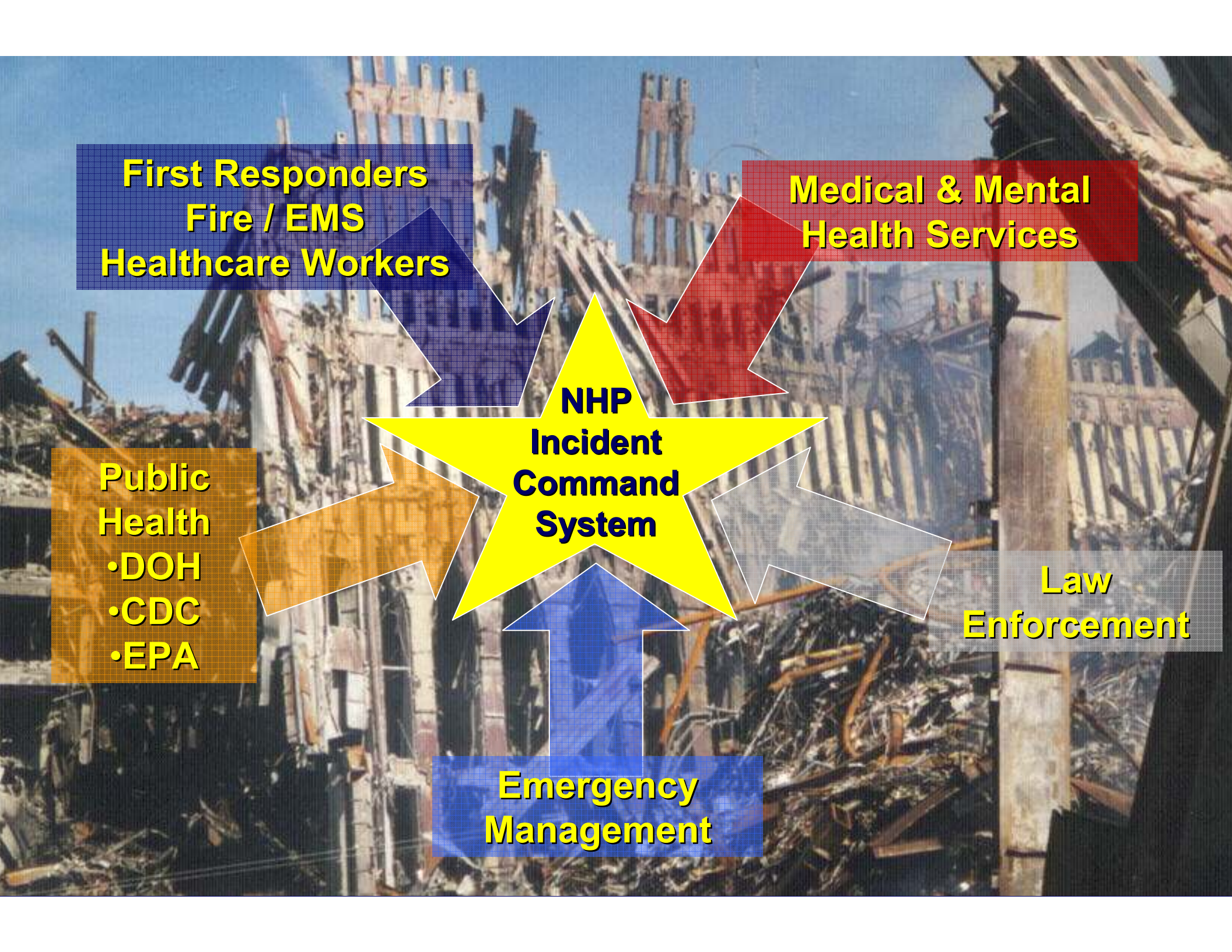
On 9/11/01:

- **>20,000 Civilians Evacuated**
- **2749 Deaths**
- **The Most Successful Evacuation in History**
- **Full Spectrum of Injuries:
Trauma -> Respiratory Failure**



From a Healthcare Perspective, What do ALL Disasters Have in Common?

- **Initial Acute Trauma**
 - **Triage & Treatment**
- **Public Health Response**
 - **Environmental Exposures**
- **Displaced Persons:**
 - **Shelter Medicine**
 - **Clean Water**
 - **Sanitation**
 - **Infection**
- **Acute & Chronic Illness ?**
- **Respite for Local Medical Staff ?**
 - **If Needed, Organized Healthcare Deployment From Outside the Area**
- **Medical Screening ?**
- **Medical Monitoring ?**
- **Medical Treatment ?**
- **Mental Health Treatment ?**



First Responders
Fire / EMS
Healthcare Workers

**Medical & Mental
Health Services**

**NHP
Incident
Command
System**

**Public
Health**
•DOH
•CDC
•EPA

**Law
Enforcement**

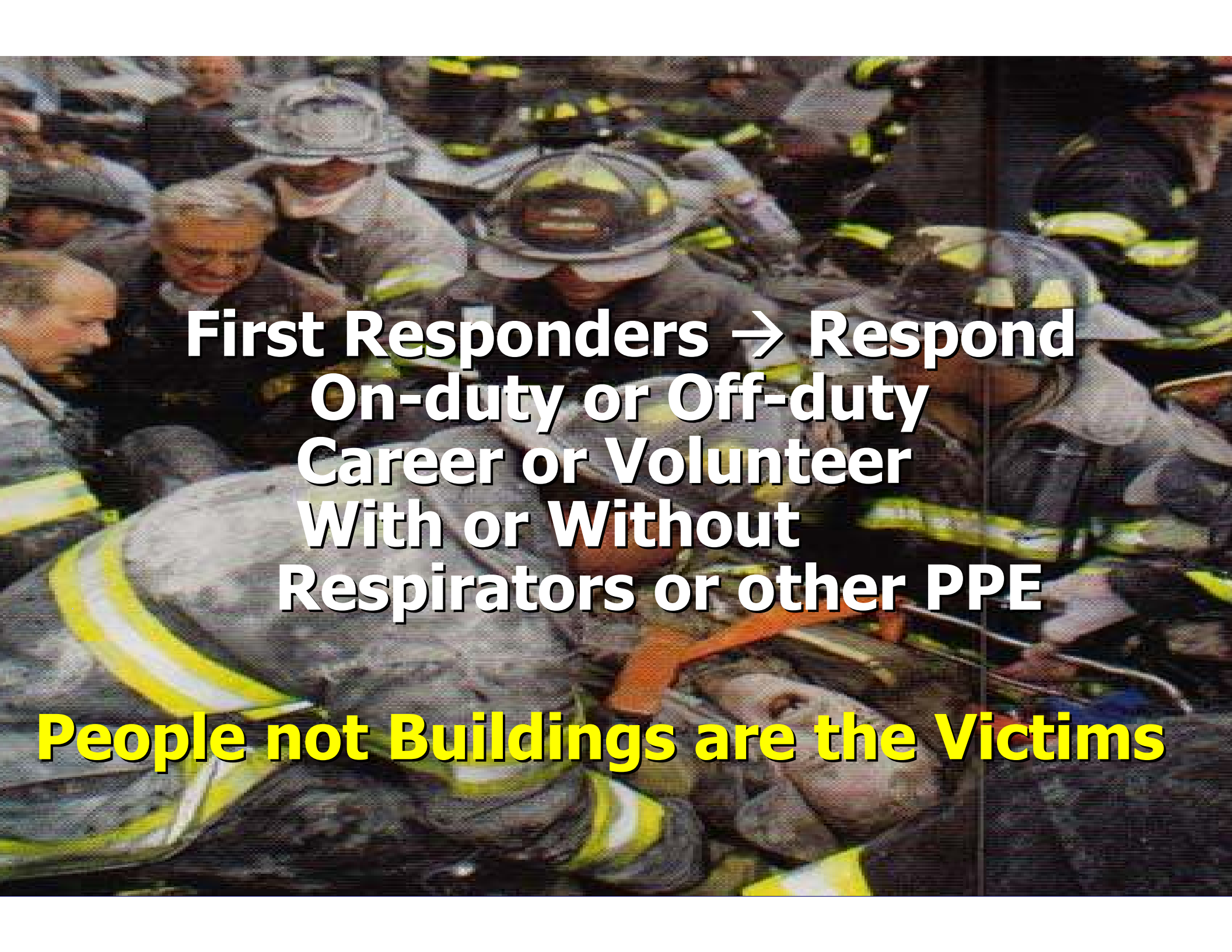
**Emergency
Management**

The Physician Role in Disaster Medicine

COMMUNICATION

Understand Your Changing Roles:

- ICS Coordinates Initial Public Message
- Liaison
- Advise
- Additional Public & Private Messages
- Patient / Public Health Advocate
- Evaluate & Treat
- Transition to Recovery
- Stress the Positive, the Negative or Both?

A photograph of several firefighters in full protective gear, including helmets and jackets with reflective yellow stripes, gathered around a person lying on the ground. The scene appears to be outdoors at night or in low light. The text is overlaid on the center of the image.

**First Responders → Respond
On-duty or Off-duty
Career or Volunteer
With or Without
Respirators or other PPE**

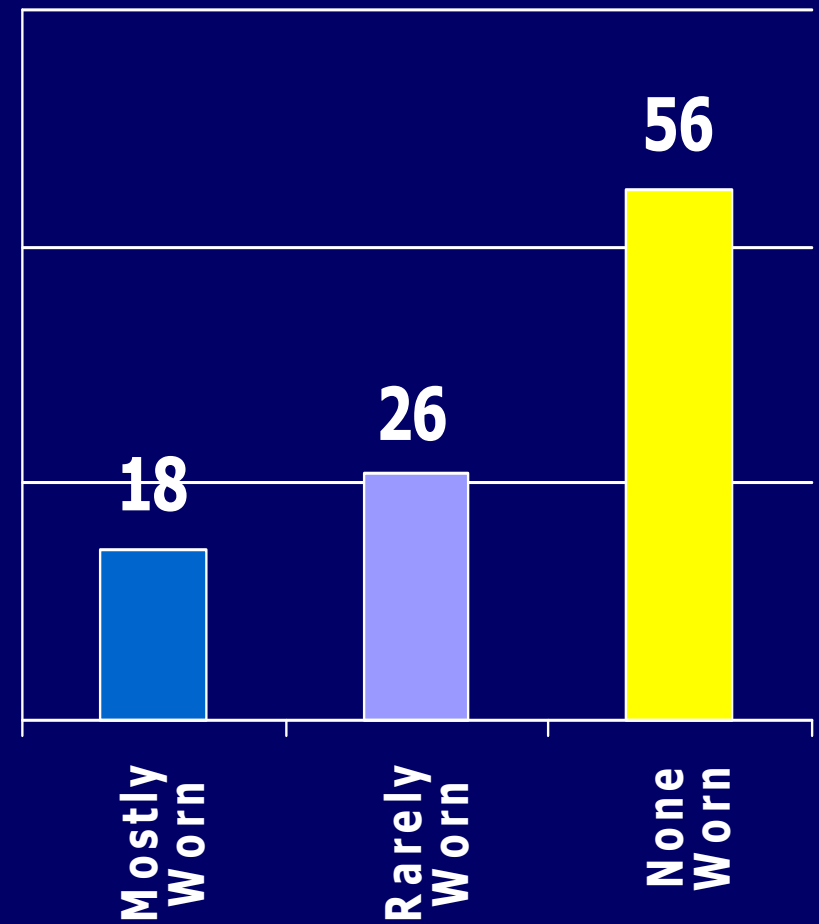
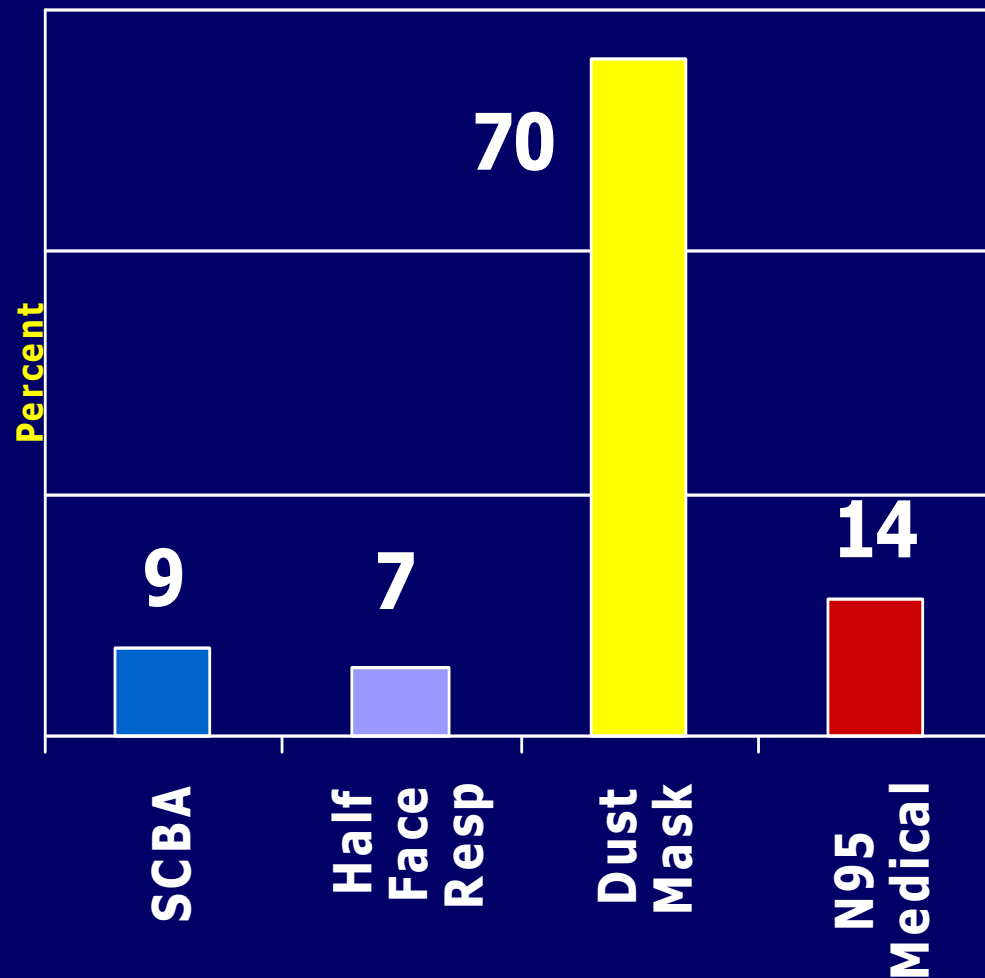
People not Buildings are the Victims

This is **NOT** the type of respiratory protection that first responders should wear at a FIRE or HAZMAT event

Exposures were **INEVITABLE**



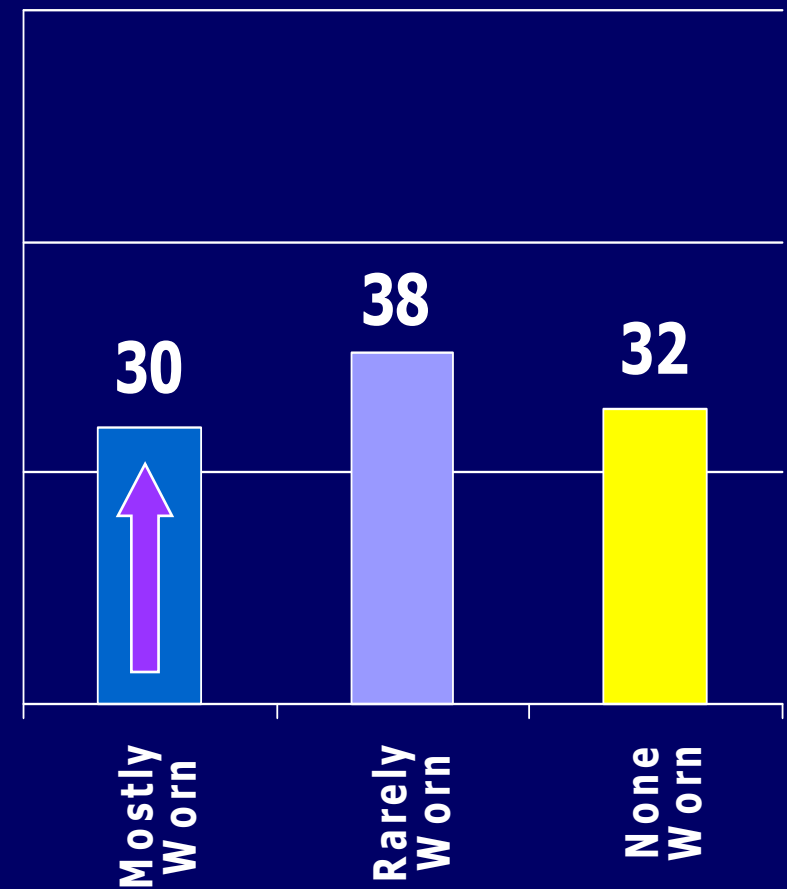
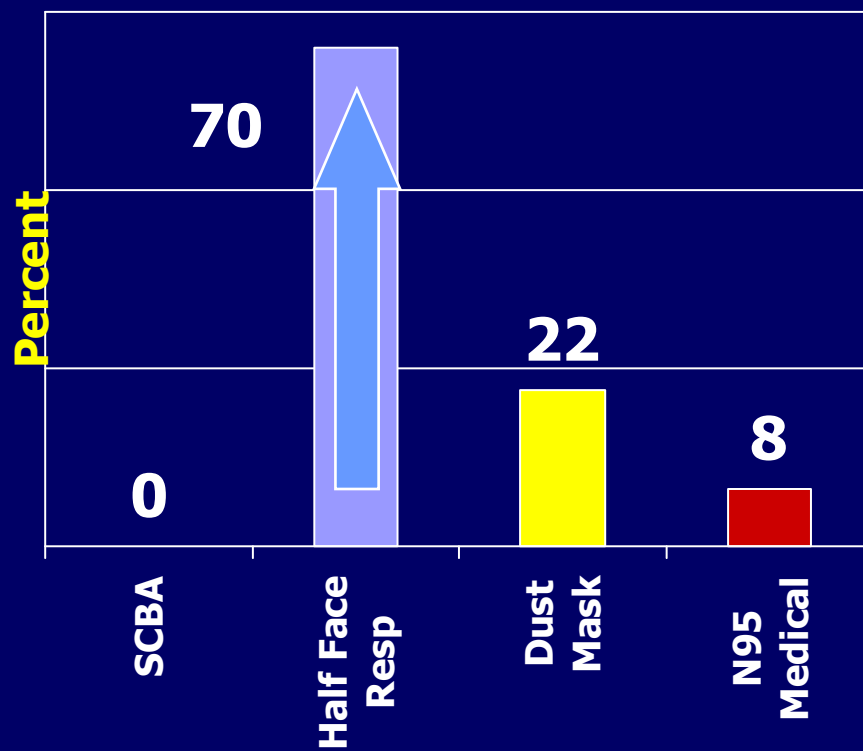
On day 1 when working, mask type worn & frequency



MMWR 2002;51:6-8.

On wk 2 when working, mask type worn & frequency

MMWR Sept 2002



A photograph of a large fire with thick black smoke billowing into the sky. In the foreground, a red fire truck is visible, and several people are standing near the base of the fire. The scene is at night or dusk, with the fire providing the primary light source.

**THIS IS WHAT WE INHALED
ON THE FIRST DAYS AND
OVER THE NEXT WEEKS**

- **AND PERSISTENT FIRE
CLOUDS ADDED TO THE
INHALATION EXPOSURE**

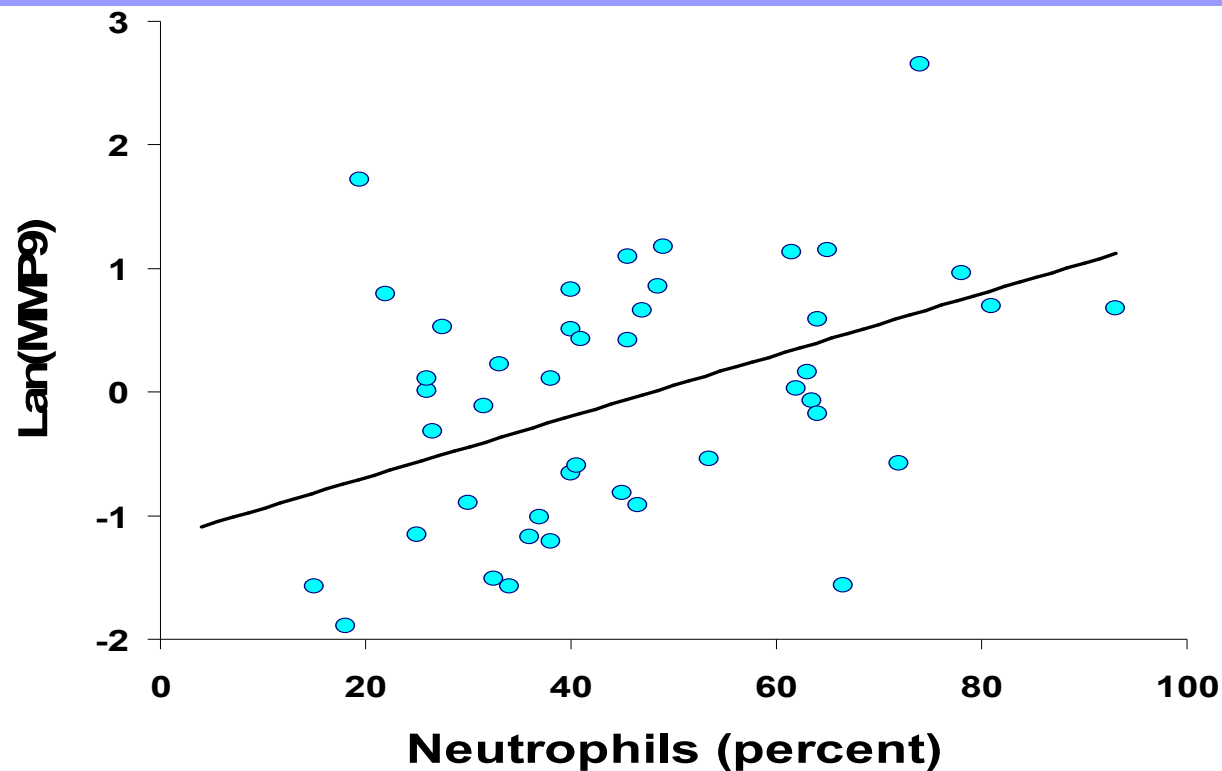
WTC DUST = Particulate Matter

The Major Toxin is Dust:

- **PULVERIZED CONCRETE**
- **FIBROUS GLASS & SILICATES**
- **CARBON PARTICULATES**
- **ASBESTOS**
- **ALKALINE pH**

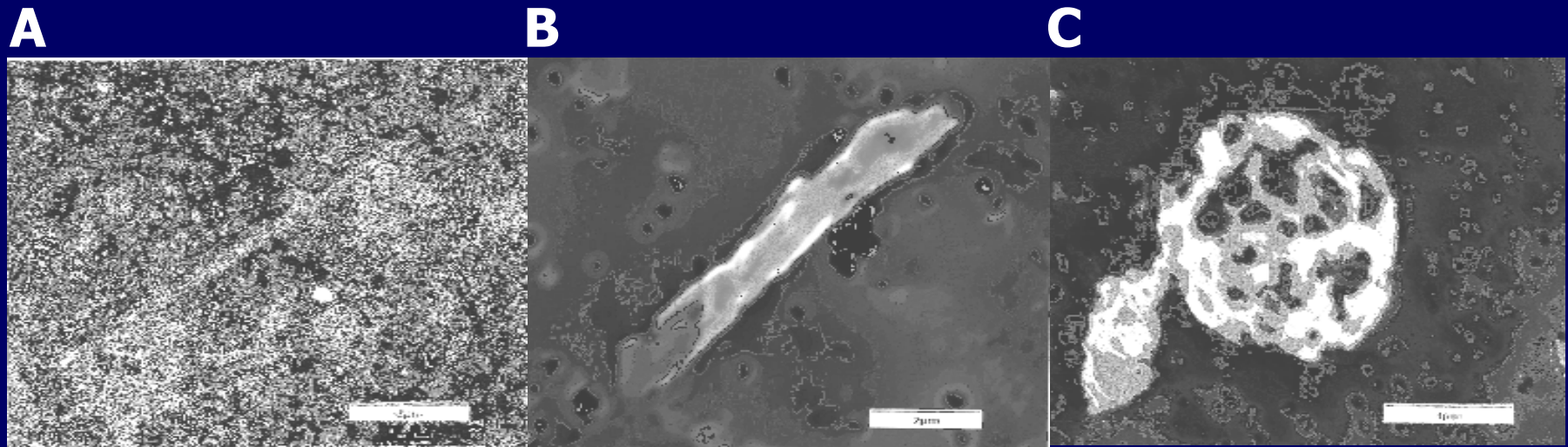
FDNY Firefighter Dust-Induced Inflammation Induced Sputum – 10 months later

Fireman, Prezant, et al. Environmental Health Perspectives: In Revisions



FDNY Firefighter with Pneumonitis

BAL Lavage Dust Particles



Uncoated asbestos fiber

Degraded fibrous glass

Fly ash particle

Rom, Weiden, Prezant, et al. Am J Resp Crit Care Med 2002, 166; 797

Host Data

Age	Training
Gender	Experience
Health	Fatigue
Fitness	Unit Issues

First Responder

Micro-Environment

PPE Use

Event:

- Fire
- Hazmat
- Rescue
- Recovery
- Medical
- Criminal
- Terrorist
- Secondary Events

Environment

- Thermal, N,B,C
- Interior Exterior
- Day or Night
- Summer or Winter
- Land, Below grade
- Sea or Air

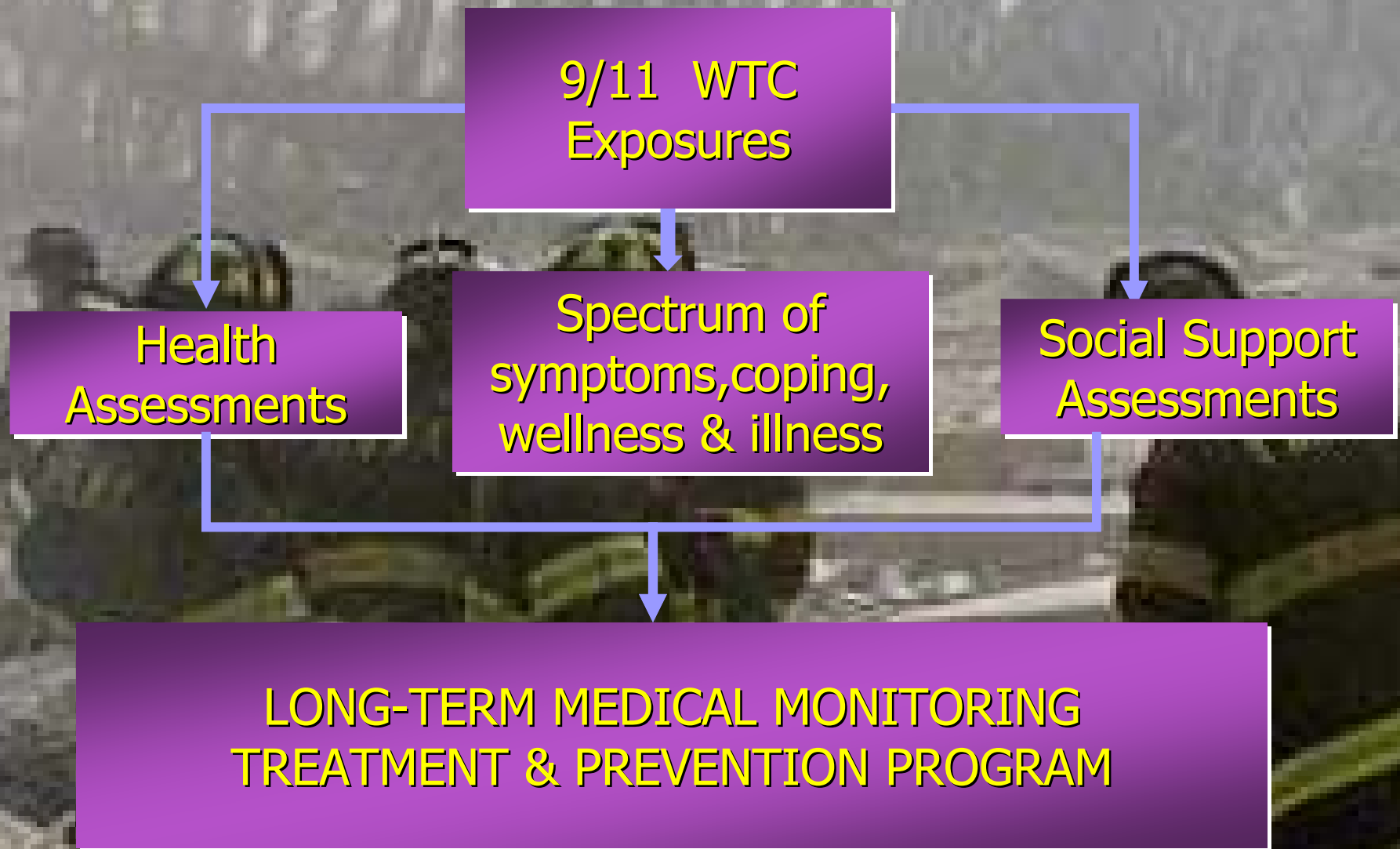
Goal is to Improve Outcomes:

- Wellness
- Injury
 - Burn
 - Trauma
- Illness
 - CardioPulm
 - Stress
 - Infectious
- Reduce Deaths

Post-Event

- Rehab
- Rescue
- Medical

FDNY WTC Medical Monitoring Program



- 
- **BASELINE AND FOLLOW-UP
WTC MEDICAL MONITORING & TREATMENT
IS ON-GOING**

- **WHAT HAVE WE LEARNED FROM THE
FDNY WTC MEDICAL MONITORING &
TREATMENT PROGRAMS**

FDNY WTC MEDICALS

- CANNOT DO
TIMELY
POST- DISASTER
MEDICAL
MONITORING
WITHOUT
PRE-EXISTING
INFRASTRUCTURE



FDNY WTC MEDICALS

- **IN 1996, FDNY, IAFF & 9 OTHER CITIES COLLABORATED IN A JOINT LABOR-MANAGEMENT INITIATIVE FOR MEDICAL MONITORING WELLNESS-FITNESS PROGRAMS**
- **FDNY USED THIS INFRASTRUCTURE FOR POST-WTC & POST-KATRINA MEDICAL EVALUATIONS**



COMPONENTS OF FDNY WTC MEDICAL:

- Questionnaires
 - Exposure, Medical & Stress
- Physician Evaluation
- PFT – Spirometry for everyone
 - Methacholine Challenge for selected groups
- Chest Radiographs for everyone
 - Chest CT for selected groups
- Bloods/Urine Bio-Monitoring
- ECG & Audiometry



FDNY WTC MEDICALS

- **October 2001 to March 02:
11,000 medicals done**

**FDNY:
Firefighters
Officers
EMS**

By 1/2006 = 13,700

**Coupled with Aggressive
Medical & Mental Health
Treatment Programs**





343 FDNY FATALITIES

14,000 FDNY SURVIVORS

**1636+, Arriving At WTC
During The AM Of The Collapse**

**6958+, Arriving At WTC
Over The Next 48 Hours**

1320+, Arriving At WTC The Next Week

A Few Hundred Arriving Thereafter

FDNY WTC MEDICALS

**In Partnership with CDC
& NIOSH (n=400; October):**

- **Hydrocarbons**
- **Antimony**
- **Dioxin & PCB Congeners**
- **Slight Elevations in Above**
 - **None Clinically Elevated**
 - **Most Normal compared to**
 - **FDNY FIREFIGHTER CONTROLS**



FDNY WTC MEDICALS

- **Total Serum PCBs**
 - Electrical Eqpt. & Food
 - USA: 0 to 6 PPB = normal
 - **WTC**
 - Avg < 6 PPB
 - 480 / 10,000 (5%) > 6 PPB
 - 36 > 12 PPB



FDNY WTC MEDICALS

- **Heavy Metals**
 - **Serum Lead**
 - 25 mcg/dl
 - 7 / 10,000 above limit
 - **Urine Mercury**
 - 35 mcg/g creatinine
 - 1 / 10,000 above limit
 - **Urine Beryllium**
 - 1 or 2 mcg /liter
 - 1 / 10,000 above limit

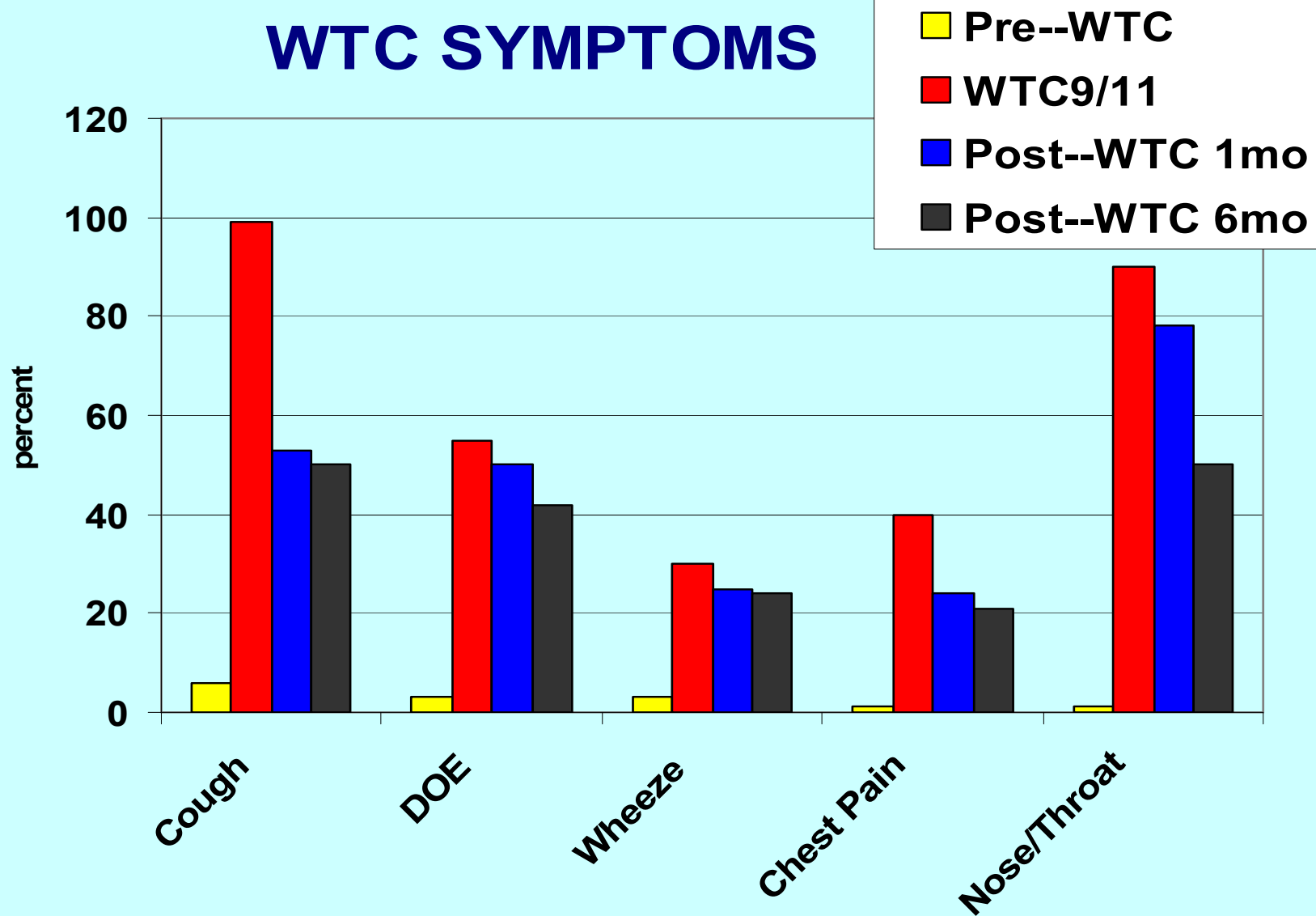


FDNY WTC MEDICALS

- ACCURATE
ANALYSIS
REQUIRES
PRE-EXPOSURE
COMPARISONS



WTC SYMPTOMS



This was a carefully selected healthy workforce pre-WTC with new, persistent symptoms post-WTC



FDNY WTC MEDICALS

Chest X-ray: PA view

- Compared to pre-WTC Chest Films
 - Comparison to Baselines
Reduce Unneeded
Workups
- Less than 30 of 9,000 were abnormal and these were in the symptomatic group



FDNY PFT from MEDICALS

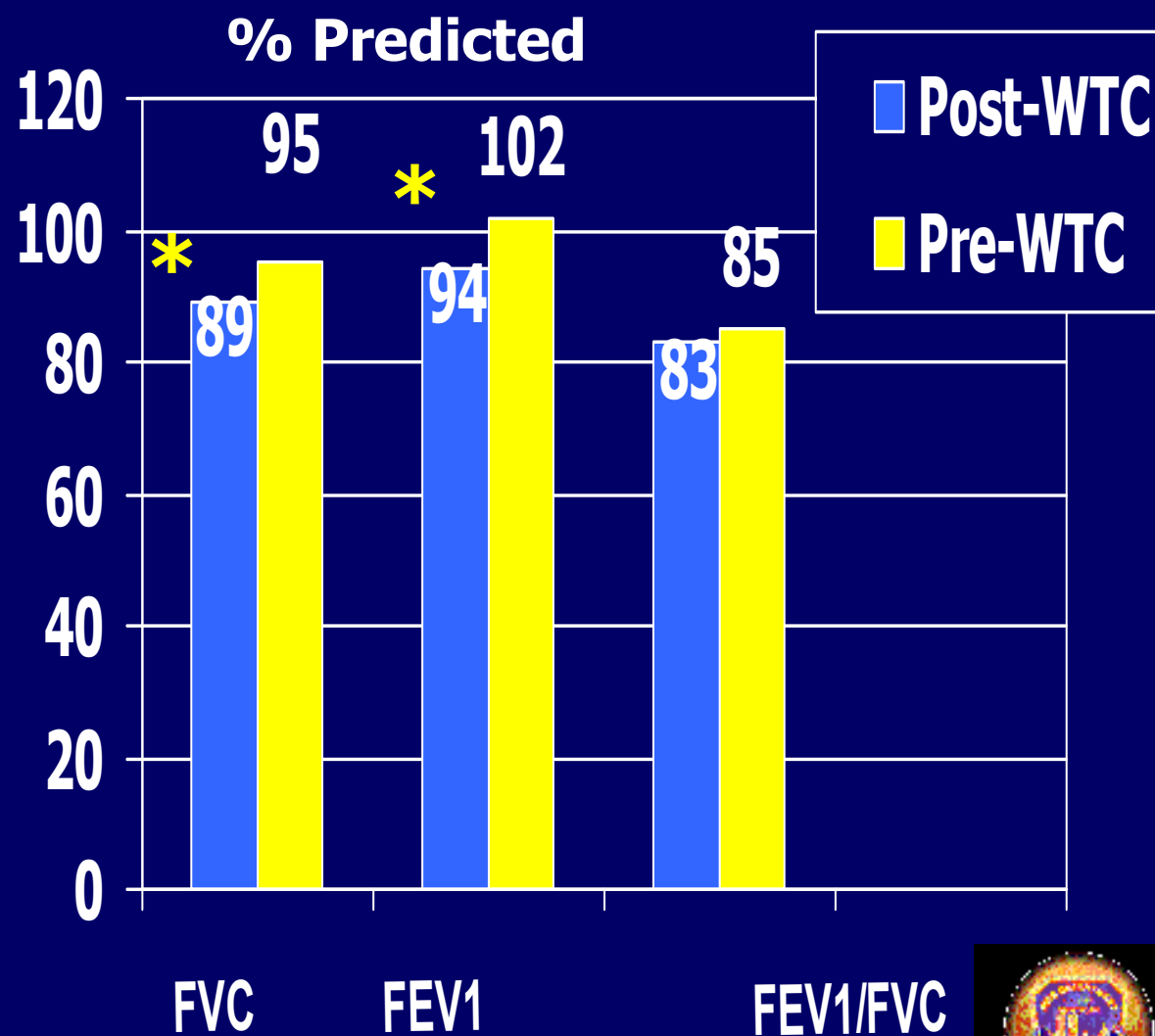
Pre-WTC vs. 1- year Post-WTC

FDNY Cohort

(n=11,766 exposed with acceptable quality pre- & post-PFT), with or without symptoms, adjusted for exposure

Post-WTC PFT wers at the lower limits of normal

Would not have appreciated the problem without having Pre-WTC PFTs for comparison



FDNY PFT from MEDICALS

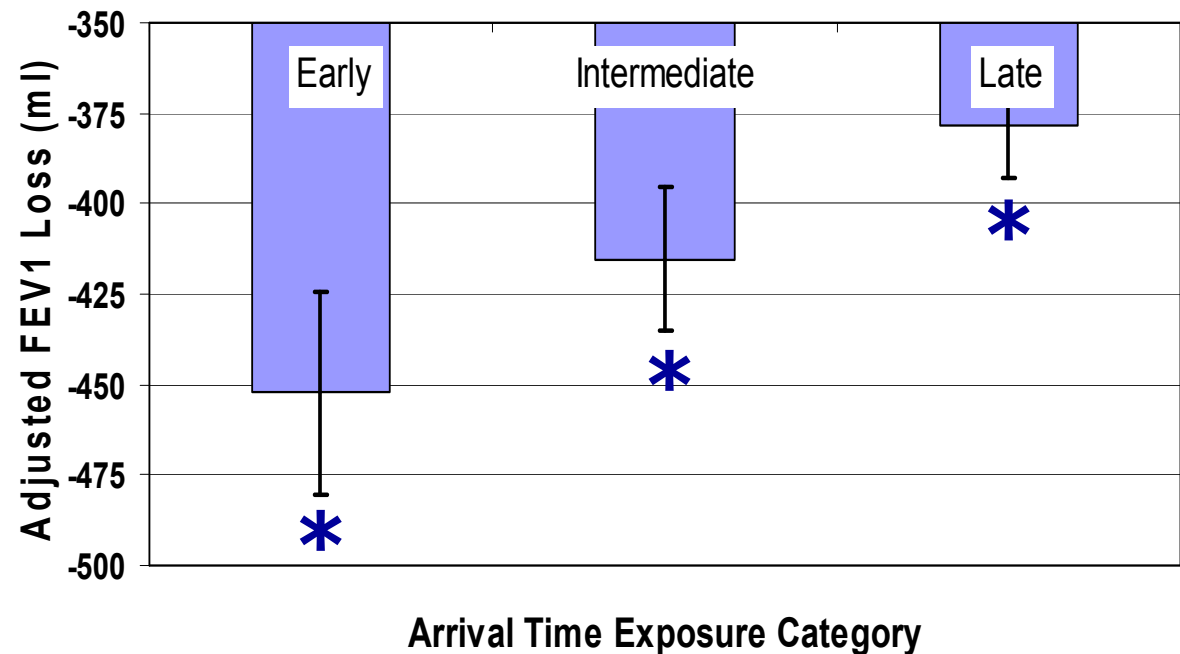
Pre-WTC vs. 1- year Post-WTC

**Entire FDNY Cohort,
With or Without Symptoms,
Adjusted for Exposure**

•Arrival Time:

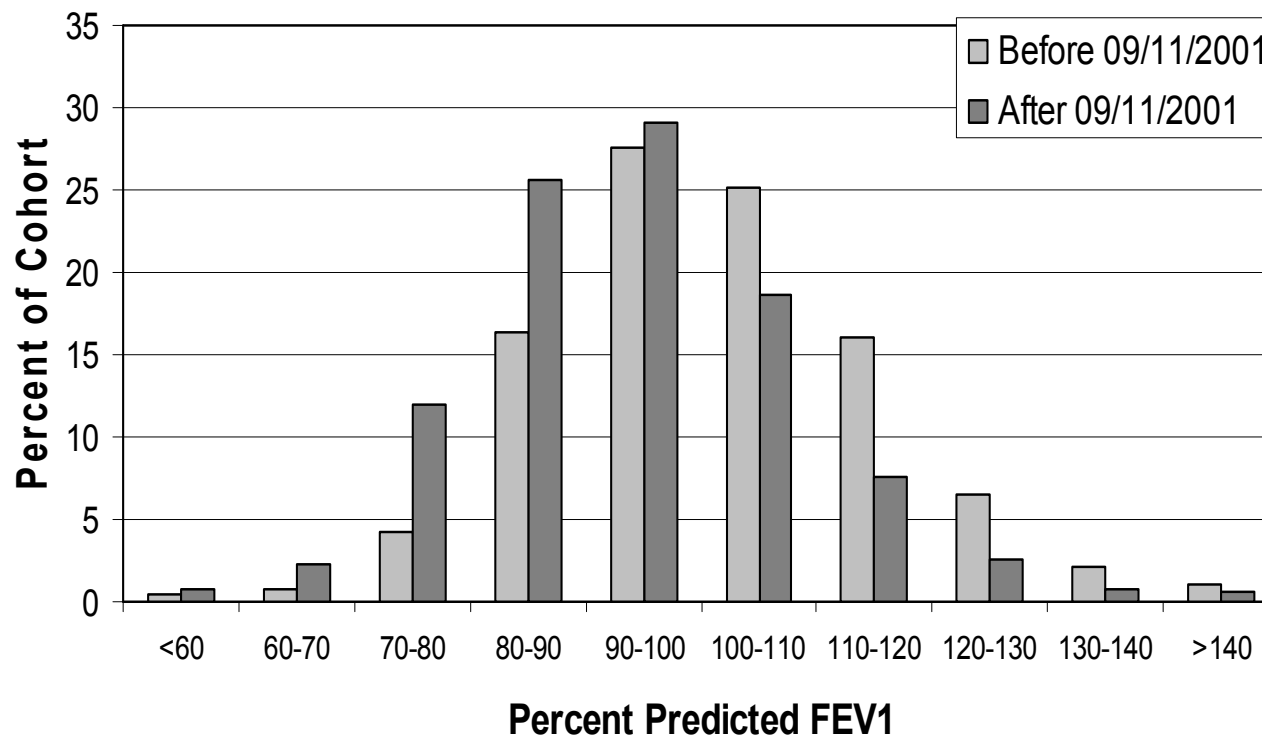
- Early (High Exp.)
 - AM of Collapse
- Intermediate
 - Next 44 hrs
- Late (Low Exp)
 - After First 48 hrs

**Adjusted FEV1 Loss During The First Year After
09/11/2001 By Arrival Time Exposure Category**



FDNY PFT from MEDICALS Pre-WTC vs. 1- year Post-WTC

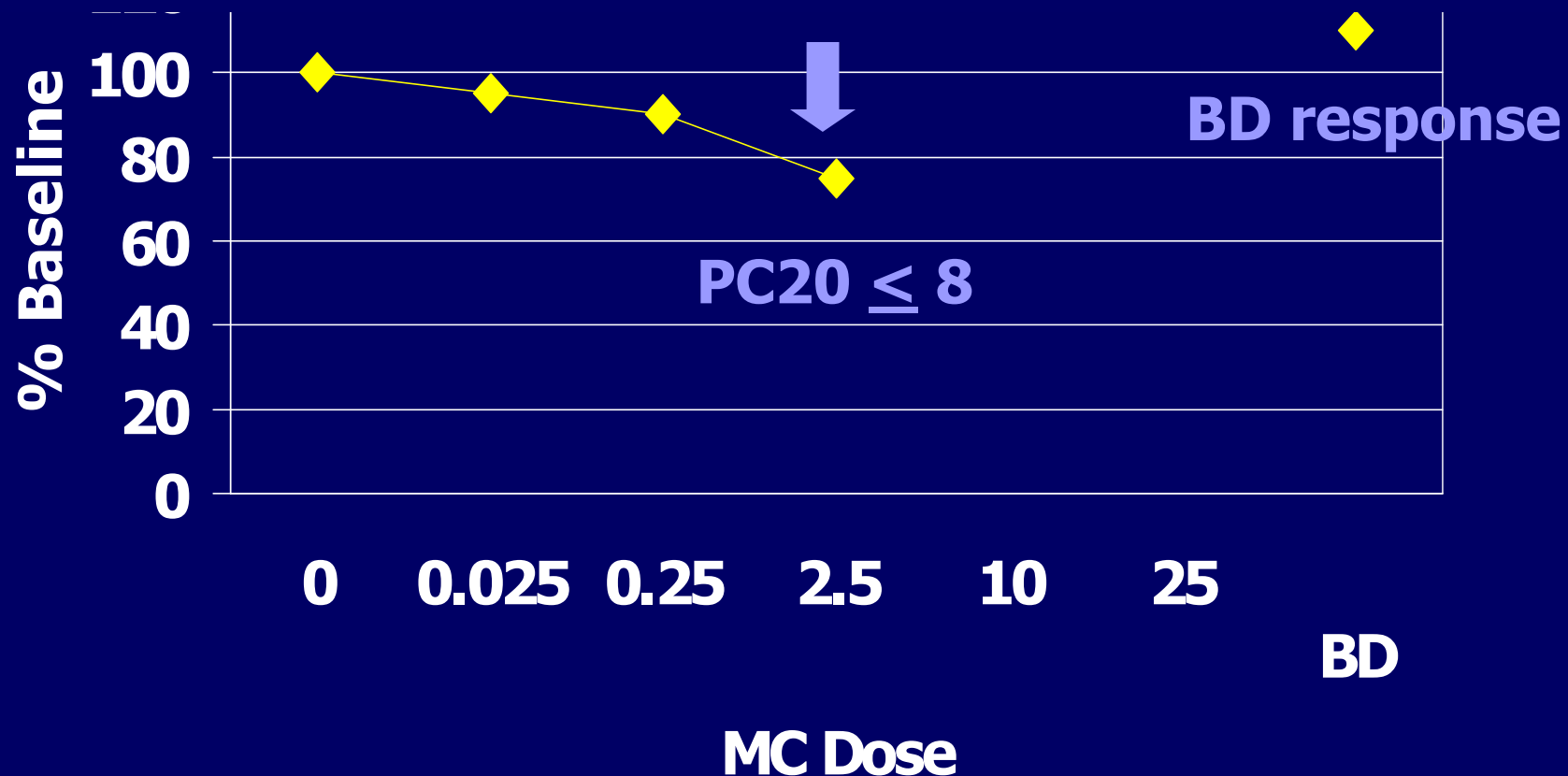
Percent Predicted FEV1 Values Before and After
09/11/2001 - Full FDNY Cohort



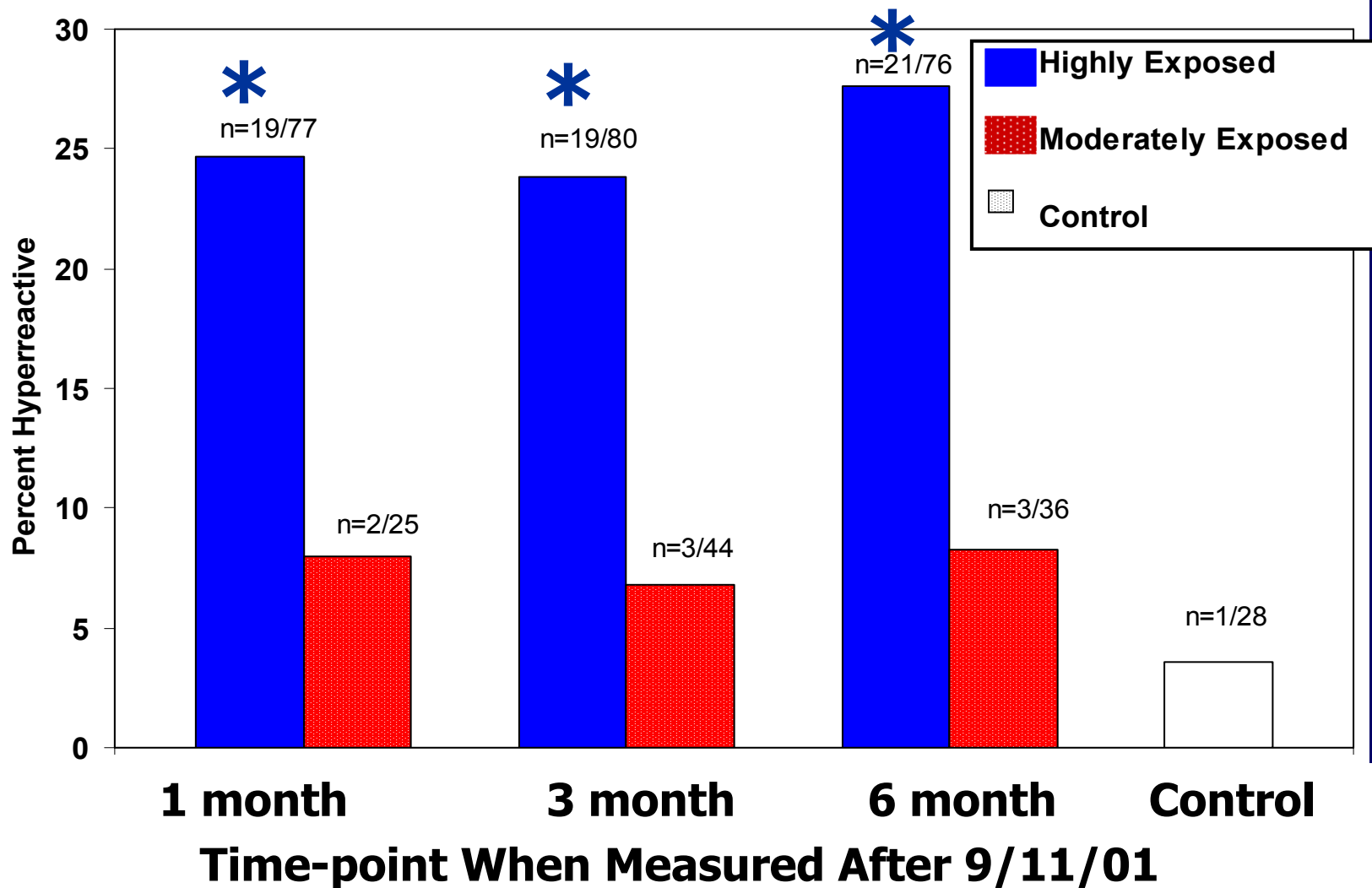
BRONCHIAL HYPERREACTIVITY

Methacholine Challenge Testing

Abnormal Result is a 20% or Greater Fall in Airflow Indicating Reactivity or Potential for an Asthma Attack



Hyperreactive Subjects PC20 < 8



Banauch, Kelly, Weiden, Prezant et al. ARRCM Sept. 2003

FDNY WTC MEDICALS

- IMPROVED
OUTCOMES
WILL OCCUR
IF COUPLE
MONITORING
WITH
TREATMENT



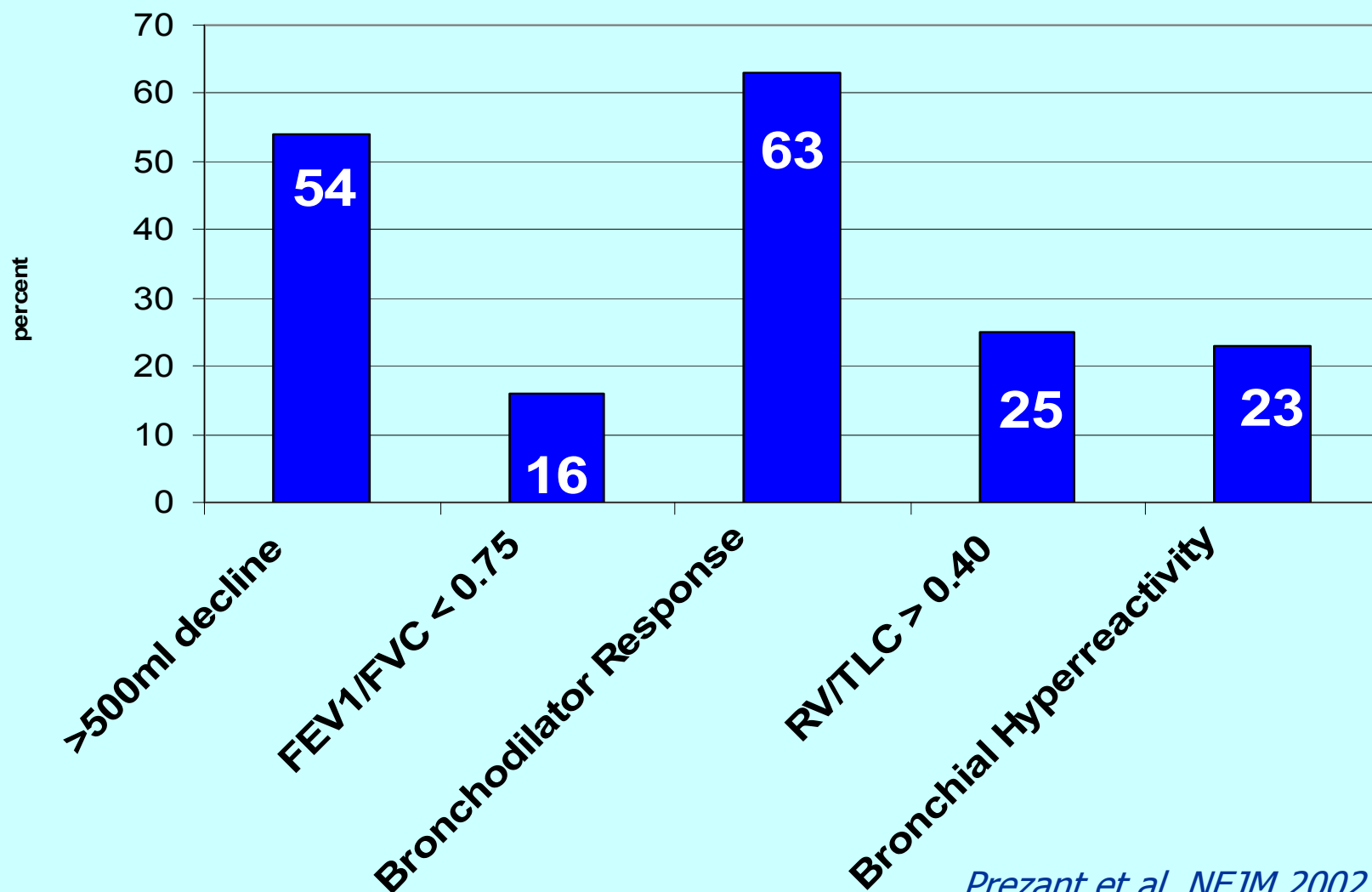
GROUND ZERO

Firefighters battle 'Trade Center cough'

"WTC COUGH"

- The Most Symptomatic Required:
- Medical Leave ≥ 4 wk
- Over 2,000 needed major Rx
- Over 600 filed disability retirement
 - To date, over 420 permanent disability

WTC COUGH PATIENTS - PFTS



Prezant et al. NEJM 2002



CHEST IMAGING IN “WTC COUGH PATIENTS”

1. CHEST FILMS

- **NORMAL IN NEARLY ALL CASES**
- **CHEST CT SCANS (n=500)**
 - **Confirmed above chest film results**
 - **Normal Inspiratory Views**
 - **Expiratory Views Showed Airway Inflammation**
 - **Bronchial Wall Thickening, Air Trapping**

FDNY FIREFIGHTER WITH “WTC COUGH”



INSPIRATORY IMAGING



**EXPIRATORY IMAGING:
AIR TRAPPING**

McGinness, Prezant et al

FDNY FIREFIGHTERS WITH PNEUMONITIS

Rare Findings in this 14,000 FDNY Cohort

- **2 with new onset Eosinophilic Pneumonitis completely reversed with treatment**
- **3 with new onset Progressive Pulmonary Fibrosis**
 - **1 Fatality**
- **1 with Mesothelioma - Fatal**
- **20 with new onset Sarcoidosis**
 - **A 3 to 5 fold increased incidence rate for FDNY**
 - **All stable, some resolved**

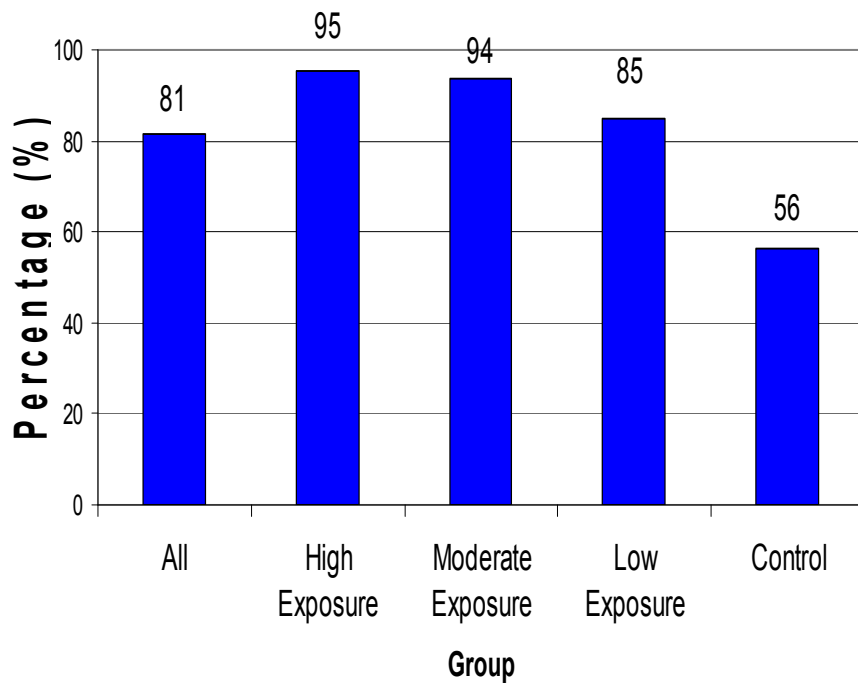
- 
- **COUGH, SINUS CONGESTION, ACID REFLUX**
 - **EXERTIONAL SHORTNESS OF BREATH**

WTC DUST CAUSED

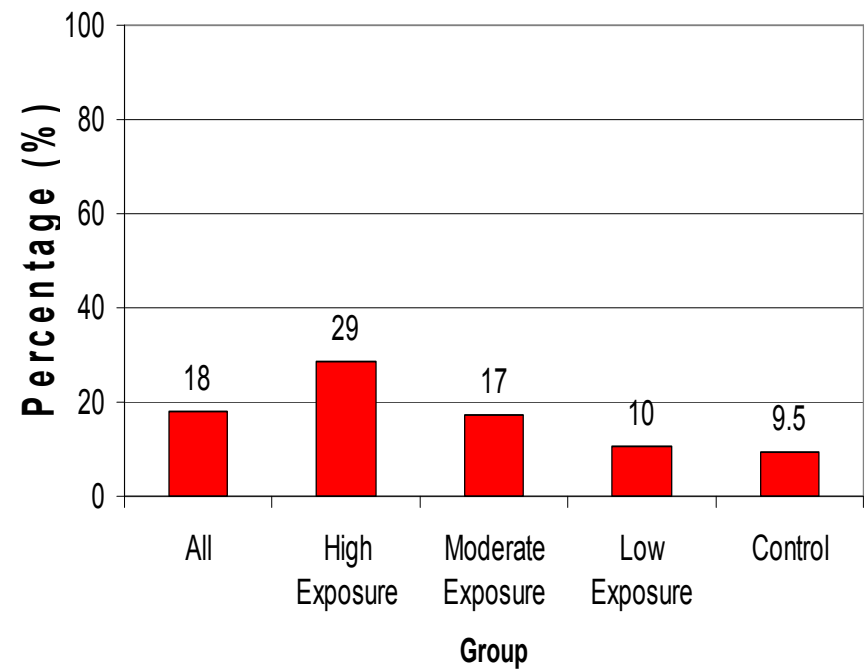
- **REDUCTIONS IN PULMONARY FUNCTION**
- **AIRWAYS INFLAMMATION**
- **Many Cases of ASTHMA or RADS**
- **Rare Cases of Pneumonitis**
- **Major Health Concerns**

FDNY HEALTH CONCERNS

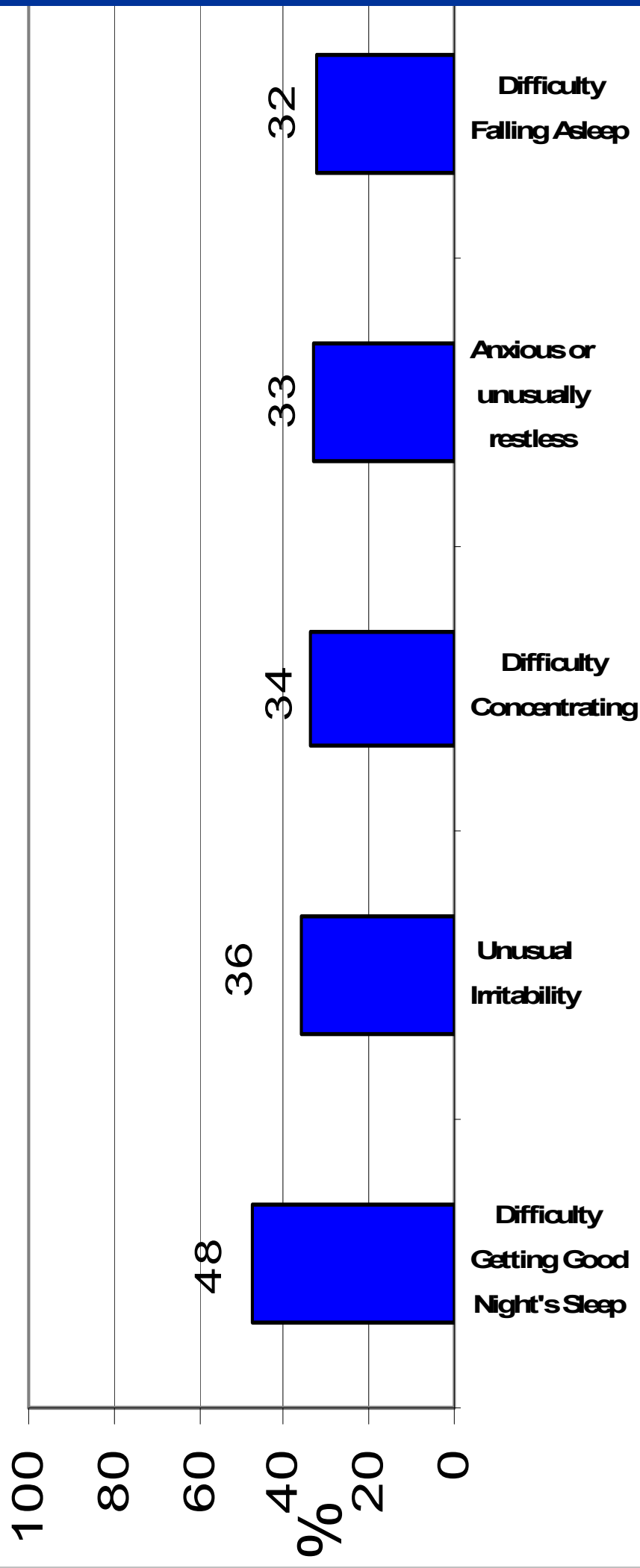
**Persons Who Worried About Their Health
By Exposure Group (0-1 yr exam)**



**Persons Who Feel Their Future May Be Cut Short
By Exposure Groups (1-2 yr exam)**



5 Most Common Mental Health Symptoms Reported



FDNY WTC Priorities:

9/11 WTC
Exposures

LONG-TERM MEDICAL MONITORING
& TREATMENT PROGRAM

Mental Health

Respiratory

Late Emerging
Diseases
(ex. Cancer)

THANK YOU

